

Integrating route optimisation with vehicle and unloading dock scheduling in LCL cargo collection

Abstract

Less container load (LCL) has become an increasingly important element in containerised cargo export, due to the involvement of numerous small and medium size enterprises. Traditional cargo collection and consolidation processes are extremely complex and inefficient, which provides an excellent opportunity for improvement through integration. In this paper, we design a two-stage model comprising vehicle route optimisation for cargo collection and vehicle and unloading dock scheduling. In the first stage, namely, the route optimisation model, the Clarke-Wright saving algorithm is used, with the objective of minimising the total transport cost for a given shipment size, weight, and capacity constraint of cargo collection vehicles. In the second stage, the scheduling of both collection vehicles and unloading dock are modelled, using two sub-models for given constraints on the time window of the unloading docks and cargo collection routes. An application of this integrated model is illustrated based on the cargo collection problems in the hinterland of Shanghai port.